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Oifig Na bPaitinní

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ABSTRACT

A bread bun production process

Ingredient materials are mixed in a first mixing machine 10 to form a sponge dough which is subsequently delivered into a dough bin 12. The sponge dough is fermented in the dough bin 12 for a preset time period and then delivered to a second mixing machine 17. Additional ingredient materials are added to the second mixing machine 17 with the dough and the fermented sponge dough is mixed with the additional ingredient materials to form a finished dough. The finished dough is divided into dough pieces in a divider 32. Downstream of the divider 32, the dough piece is passed through an initial prover 40. Dough pieces discharged from the initial prover 40 are rolled into a flat dough cake and each dough cake is dropped onto a baking tray. Each dough cake sits in one of a number of circular cups formed in the tray. Each tray passes through a cleaner 45 at which excess flour is removed from the dough cakes and tray and each dough cake is centred in its circular cup on the tray. The trays pass through a final prover 50 and then an oven to bake the dough. Downstream of the oven 52, baked buns are removed from the trays at a de-panning station 57 and delivered to a cooler 59 prior to packing. <Fig.1>

"A Bread Bun Production Process"

This invention relates to a bread bun production process, in particular for the production of a hamburger bun.

The invention is particularly concerned with the production of a high quality bread bun of consistent shape, having good resilience and an ability to caramelise on toasting to form a surface skin which is resistant to impregnation by fillings such as sauces used with the bun.

According to the invention there is provided a bread bun production process comprising the steps:

weighing pre-set quantities of selected ingredient materials,

delivering the ingredient materials to a first mixing machine,

mixing the ingredient materials in the first mixing machine to form a sponge dough mix,

discharging the sponge dough mix from the first mixing machine to a dough bin,

fermenting the sponge dough in the dough bin for a pre-set time period,

discharging the fermented dough from the dough bin into a second mixing machine,

delivering additional ingredient materials to the second mixing machine,

mixing the fermented sponge dough with the additional ingredient materials in the second mixing machine to form a finished dough,

delivering the finished dough from the second mixing machine to a divider,

extruding the finished dough from an outlet of the divider,

cutting the extruded dough into dough pieces of a desired size,

rolling the dough pieces into balls,

delivering the dough balls through an initial prover,

discharging the dough balls from the initial prover,

rolling each dough ball into a flat dough cake,

dropping each dough cake onto a tray, each dough cake sitting in one of a number of circular cups formed in the tray,

cleaning excess flour from the dough cakes and the tray,

centering each dough cake in its associated tray cup,

conveying the tray through a final prover,

delivering the tray through an oven downstream of the final prover to bake the dough cakes for forming bread buns,

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conveying the tray from the oven to a de-panning station,

removing the buns from the tray at the de-panning station,

cooling the buns in air by carrying the buns along a carousel for a pre-set time period,

delivering the buns to a packing station and packing the buns in containers.

In one embodiment the process includes discharging the fermented dough from the dough bin to the second mixer by mounting the dough bin on a carriage, elevating the carriage on a support frame, tilting the carriage at an upper end of the support frame for pouring the fermented dough from the dough bin into a dough delivery chute for directing the fermented dough into the second mixer.

In another embodiment the process includes discharging the finished dough from the second mixer into a dough hopper, feeding the finished dough from the dough hopper to the divider by forcing the dough through a supply pipe extending between an outlet of the dough hopper and the divider by means of a complementary pair of screws mounted at the outlet of the dough hopper.

In a further embodiment the process includes extruding the finished dough in a controlled manner through a die-head at the outlet of the divider, cutting away a dough piece from a free end of the dough, dropping the dough piece onto a feed conveyor for delivery to the initial prover, advancing each dough piece on the feed conveyor to engage and roll along upstanding overhead guide arms which are

angled across the conveyor path, for rolling the dough pieces into balls.

In another embodiment the process includes passing each tray upstream of the final prover under a suction head, applying a vacuum to the suction head for extracting excess flour from the tray and dough cakes carried thereon. Preferably, the process includes directing an air jet at each circular cup in the tray as the tray is passing beneath the suction head for floating each dough cake within the cup, blowing away excess flour from the tray and extracting the excess flour through the suction head.

In another embodiment the process includes delivering the trays through a seeding station located between the final prover and the oven, at the seeding station, spraying a fine water spray onto a top surface of each dough cake and then sprinkling seeds onto the top surface of each dough cake.

In a further embodiment the process includes the step of conveying trays from the de-panning station to the outlet of the initial prover for re-loading, passing the trays through a tray cleaner, in the tray cleaner, directing a jet of air at the tray for cleaning the tray and brushing a top surface of the tray by means of rotating brushes.

In a preferred embodiment the process includes conveying the trays from the de-panning station to the outlet of the initial prover for re-loading, cooling the trays by blowing cooling air at the trays. Conveniently the process includes blowing ambient air at an upper surface of the trays with overhead fans and directing jets of chilled air at an underside of each tray for cooling each tray.

The invention will be more clearly understood from the following description of some embodiments thereof, given by way of example only with reference to the accompanying drawings in which:-

Fig. 1 is a schematic plan view illustrating a bread bun production line according to the invention;

Fig. 2 is a perspective view of a fermenting bay used in the process;

Fig. 3 is a perspective view of dough handling apparatus used in the process;

Fig. 4 is a side elevational view of the dough handling apparatus of Fig. 3;

Fig. 5 is a perspective view of a dough transfer apparatus used in the process;

Fig. 6 is a perspective view of flour extraction apparatus used in the process;

Fig. 7 is a perspective view of tray handling conveyors used in the process;

Fig. 8 is a perspective view of a tray cleaning apparatus used in the process;

Fig. 9 is a perspective view of tray cooling apparatus used in the process;

Fig. 10 is a plan schematic view of packing apparatus used in the process;

Fig. 11 is a side elevational view of a number of buns stacked in the packing apparatus;

Fig. 12 is a detailed schematic side sectional elevational view of portion of the packing apparatus; and

Fig. 13 is a perspective view of a bun wrapper of the packing apparatus.

Referring to the drawings a process and apparatus for producing bread buns according to the invention will be described.

Pre-set quantities of selected ingredient materials are delivered from storage bins to a weigher which weighs a batch of ingredient materials. The ingredient materials are discharged from the weigher into a first mixing machine 10 in which the ingredient materials are mixed to form a sponge dough mix. The ingredient materials for the sponge dough mix comprise flour, water, conditioner and yeast. After mixing the sponge dough mix is discharged from the mixing machine 10 into a dough bin 12 (Fig. 2).

The dough bin 12 is then wheeled into a fermenting bay 14 which is adapted for storage of a plurality of dough bins 12 as illustrated in Fig. 2 for fermenting the dough in each bin 12 for pre-set desirable time period. A split skirt 15 of plastics material hangs down at an entrance to the fermenting bay 14.

After fermenting the dough as required, the dough bin 12 is delivered to a second mixing station 16 for delivery into a second mixer 17. To discharge the dough into the second mixer 17 the dough bin 12 is elevated on a carriage 18 (Figs. 3 and 4) which is vertically movable on a

support frame 19. With the carriage 18 in a lowered position the bin 12 can be wheeled into engagement with the carriage 18 being positioned between carrying arms 20 at opposite ends of the carriage 18 and against a front stop bar 21 of the carriage. An overhead retaining bar 22 engages an upper rim of the dough bin 12. When engaged with the carriage 18 the carriage 18 is raised on the support frame 19 a pair of spaced-apart rollers on an outside face of each carrying arm 20 engaging the associated channel guides or tracks 23 on the support frame 19. As shown in Fig. 4, the inner track 23 has an inwardly curved upper end 24 to tilt the arms 20 and hence the bin 12 on the support frame 19. As it reaches an upper end of the support frame 19 the carriage 18 tilts on the support frame 19 for pouring the fermented dough from the dough bin 12 into an inclined dough delivery chute 26, having an inlet 27 for reception of dough from the dough bin 12 and an outlet 28 which aligns with an inlet of the mixer 17 for feeding the fermented dough to the mixer 17.

Additional ingredient materials are weighed in a weigher 29 and added to the fermented dough in the second mixer 17. Typically the additional ingredient materials comprise flour, water, shortening, sugar, brine and yeast. The fermented dough and the additional ingredient materials are thoroughly mixed in the mixer 17 to produce a finished dough. After mixing the finished dough is discharged from the second mixer 17 into a dough hopper 30. The mixer 17 has a rotatable bowl 31 which pivots to receive dough from the chute 26 and for discharging dough to the hopper 30. The finished dough is delivered from the dough hopper 30 to a divider 32 by forcing the dough through a supply pipe 33 extending between an outlet of the dough hopper and the divider 32. A complementary pair of screws 34, 35 are mounted at the outlet of the dough

hopper 30 for delivery of the dough through the supply pipe 33.

A number of cylindrical strips of dough are extruded through a die-head at an outlet of the divider 32, a dough piece being cut-away from a free end of each dough strip, the dough piece dropping onto a feed conveyor 36 connected to an initial prover 40. Each dough piece is advanced on the feed conveyor to engage and roll along an upstanding overhead guide arm 37 which is angled across the conveyor path for rolling the dough pieces into balls before passing the dough balls through the initial prover 40.

Referring to Fig. 6, at an outlet of the initial prover 40 each dough ball is rolled into a flat dough cake 41 which is dropped onto a tray 43 which is carried on a tray conveyor 42. Each dough cake fits in one of a number of circular cups 44 formed in the tray 43. The tray is then delivered to a cleaning and centering apparatus 45 having a suction head 46 to which a vacuum is applied for extracting excess flour from the tray and any dough cakes thereon. In passing through the cleaner 45, each dough cake is also centered in its associated tray cup. As each tray 43 passes beneath the suction head 46, air jets (not shown) direct pressurised air at the side of each cup 44 in the tray 43. This causes the circular dough cake to rise slightly out of the cup, floating on an air cushion within the cup 44. Any excess flour or other matter is blown away and at the same time, because the jets are at the side of each cup 44 when they slacken off, each dough cake drops in the centre of the cup 44. The suction fan sucks the excess flour away.

It will be appreciated that this centralising of the dough pieces is important to ensure an even expansion of the dough within the tray cups giving a uniform bun shape.

Next the trays are delivered to a final prover 50 through which the trays travel for a pre-set time period, the climate within the final prover 50 being controlled to achieve the desired proving of the dough cakes. The final prover 50 is a double spiral. The trays 43 enter at a bottom of the prover. The trays are conveyed to a top of a first spiral where they then travel to a second spiral which is directly behind the first spiral and they are then conveyed down to a bottom of the prover on the second spiral and discharged through an exit of the prover at a bottom of the prover.

Downstream of the final prover 50 the trays are delivered through an oven 52 to bake the dough cakes for forming bread buns.

If desired sesame seeds or the like may be sprinkled onto a top surface of each dough cake prior to entry into the oven 52 as the trays passed through a seeding station 55. At the seeding station a fine water spray is sprayed onto a top surface of each dough cake and then seeds are sprinkled onto the top surface of each dough cake.

Downstream of the oven 52 the trays pass through a de-panner 57 at which the baked buns are lifted off the tray and deposited on a feed conveyor 58 for delivery to a carousel type cooler 59. The buns are carried around the carousel 59 for a pre-set time period to cool the buns naturally in ambient air.

It will be noted that each tray has a non-stick teflon coated upper surface. This has several advantages over conventional metal trays. Firstly, no greasing of the trays is required to facilitate removal of the buns after baking. Also, and more importantly from a quality point

of view, the base of the buns are not marked by the tray which is typically the case when greased trays are used.

Downstream of the carousel cooler 59 the cooled buns are delivered to a packing station, described later.

Trays discharged from the de-panner 57 pass through a tray cleaner 60. As the trays pass through the cleaner 60 (Fig. 8), air jets 61 are directed at the tray for cleaning the tray. Further, a pair of spaced-apart rotating brushes 62 engage and brush a top surface of each tray as the tray passes beneath the brushes 62. A drive motor 63 for the brushes 62 is mounted on a support frame 64 which rotatably carries the brushes 62. Access for inspection and maintenance is provided by a door 65 at a front of the cleaner 60.

Downstream of the cleaner 60, the trays pass through a cooling station 70 (Fig. 9). In passing through the cooling station 70 ambient air is blown onto the trays by means of a number of spaced-apart overhead fans 71. At the same time jets of chilled air are discharged upwardly from a supply pipe 72 beneath the trays to impinge against an underside of each tray for cooling the tray.

Referring now to Figs. 10 to 13, downstream of the carousel 59 the cooled buns are delivered to a packing station 80. The cooled bread buns are delivered on a conveyor 81 to the packing station 80. Three different packing lines 82, 83, 84 extend at right angles to the conveyor 81. The appropriate packing line 82, 83, 84 can be selected by operation of overhead deflector arms to guide the buns onto the appropriate line 82, 83, 84.

On the packing lines, the buns may be arranged on trays for bulk delivery or may be packaged in plastic wrappers

containing typically six or twelve buns. The buns may also be sliced prior to packaging.

At the packing line 84 the buns are collected and delivered through a slicing machine which slices the buns in half. Figs. 9 to 12 show apparatus for wrapping a number of buns, in this case six, in a plastics wrapper. Two rows of three buns are fed by conveyors 85, 86 into a stacker 87 within the stacker 87, the conveyors are displaced vertically. A pusher 88 is operable to push the buns from the upper conveyor 85 onto the buns on the lower conveyor 86. It will be noted that the conveyors 85, 86 are controlled such that the top row of buns is rearwardly offset on the bottom row of buns as shown in Fig. 10. This advantageously prevents the leading bun on the top row dropping in front of the lower row of buns as they are carried together along the conveyor. The stacked buns are then delivered to an alignment device 90 which brings the two rows of buns into alignment immediately prior to encasing the buns in a plastic wrapper. The alignment device 90 has a number of arms 91 mounted on an endless rotating belt 92 above the conveyor 86, the arms 91 engaging and pushing the two rows of buns together, the buns being securely held together by trailing ribbons 94 which frictionally engage the upper buns to retain them in place on the lower row of buns. In this manner, the buns are tightly packed in a close fitting plastics wrapper at a wrapping station 95 so that the wrapper will retain its shape even with rough handling.

The invention is not limited to the embodiments hereinbefore described which may be varied in both construction and detail.

CLAIMS

1. A bread bun production process comprising the steps:

weighing pre-set quantities of selected ingredient materials,

delivering the ingredient materials to a first mixing machine,

mixing the ingredient materials in the first mixing machine to form a sponge dough mix,

discharging the sponge dough mix form the first mixing machine to a dough bin,

fermenting the sponge dough in the dough bin for a pre-set time period,

discharging the fermented dough from the dough bin into a second mixing machine,

delivering additional ingredient materials to the second mixing machine,

mixing the fermented sponge dough with the additional ingredient materials in the second mixing machine to form a finished dough,

delivering the finished dough from the second mixing machine to a divider,

extruding the finished dough from an outlet of the divider,

cutting the extruded dough into dough pieces of a desired size,

rolling the dough pieces into balls,

delivering the dough balls through an initial prover,

discharging the dough balls from the initial prover,

rolling each dough ball into a flat dough cake,

dropping each dough cake onto a tray, each dough cake sitting in one of a number of circular cups formed in the tray,

cleaning excess flour from the dough cakes and the tray,

centering each dough cake in its associated tray cup,

conveying the tray to a final prover,

delivering the tray through an oven downstream of the final prover to bake the dough cakes for forming bread buns,

conveying the tray from the oven to a de-panning station,

removing the buns from the tray at the de-panning station,

cooling the buns in air by carrying the buns along a carousel for a pre-set time period;

delivering the buns to a packing station and packing the buns in containers.

2. A process as claimed in claim 1, which includes discharging the fermented dough from the dough bin to the second mixer by mounting the dough bin on a carriage, elevating the carriage on a support frame, tilting the carriage at an upper end of the support frame for pouring the fermented dough from the dough bin into a dough delivery chute for directing the fermented dough into the second mixer.

3. A process as claimed in claim 1 or 2 which includes discharging the finished dough from the second mixer into a dough hopper, feeding the finished dough from the dough hopper to the divider by forcing the dough through a supply pipe extending between an outlet of the dough hopper and the divider by means of a complementary pair of screws mounted at the outlet of the dough hopper.

4. A process as claimed in any preceding claim which includes extruding the finished dough in a controlled manner through a die-head at the outlet of the divider, cutting away a dough piece from a free end of the dough, dropping the dough piece onto a feed conveyor for delivery to the initial prover, advancing each dough piece on the feed conveyor to engage and roll along upstanding overhead guide arms which are angled across the conveyor path, for rolling the dough pieces into balls.

5. A process as claimed in any preceding claim which includes passing each tray upstream of the final prover under a suction head, applying a vacuum to the suction head for extracting excess flour from the tray and dough cakes carried thereon.

6. A process as claimed in claim 5 which includes directing an air jet at each circular cup in the tray as the tray is passing beneath the suction head for floating each dough cake within the cup, blowing away excess flour from the tray and extracting the excess flour through the suction head.

7. A process as claimed in any preceding claim including delivering the trays through a seeding station located between the final prover and the oven, at the seeding station, spraying a fine water spray onto a top surface of each dough cake and then sprinkling seeds onto the top surface of each dough cake.

8. A process as claimed in any preceding claim including the step of conveying trays from the de-panning station to the outlet of the initial prover for re-loading, passing the trays through a tray cleaner, in the tray cleaner, directing a jet of air at the tray for cleaning the tray and brushing a top surface of the tray by means of rotating brushes.

9. A process as claimed in any preceding claim which includes conveying the trays from the de-panning station to the outlet of the initial prover for re-loading, cooling the trays by blowing cooling air at the trays.

10. A process as claimed in claim 9 which includes blowing ambient air at an upper surface of the trays

with overhead fans and directing jets of chilled air at an underside of each tray for cooling each tray.

11. A bread bun production process substantially as hereinbefore described with reference to the accompanying drawings.

12. Bread buns whenever produced according to the process as claimed in any preceding claim.

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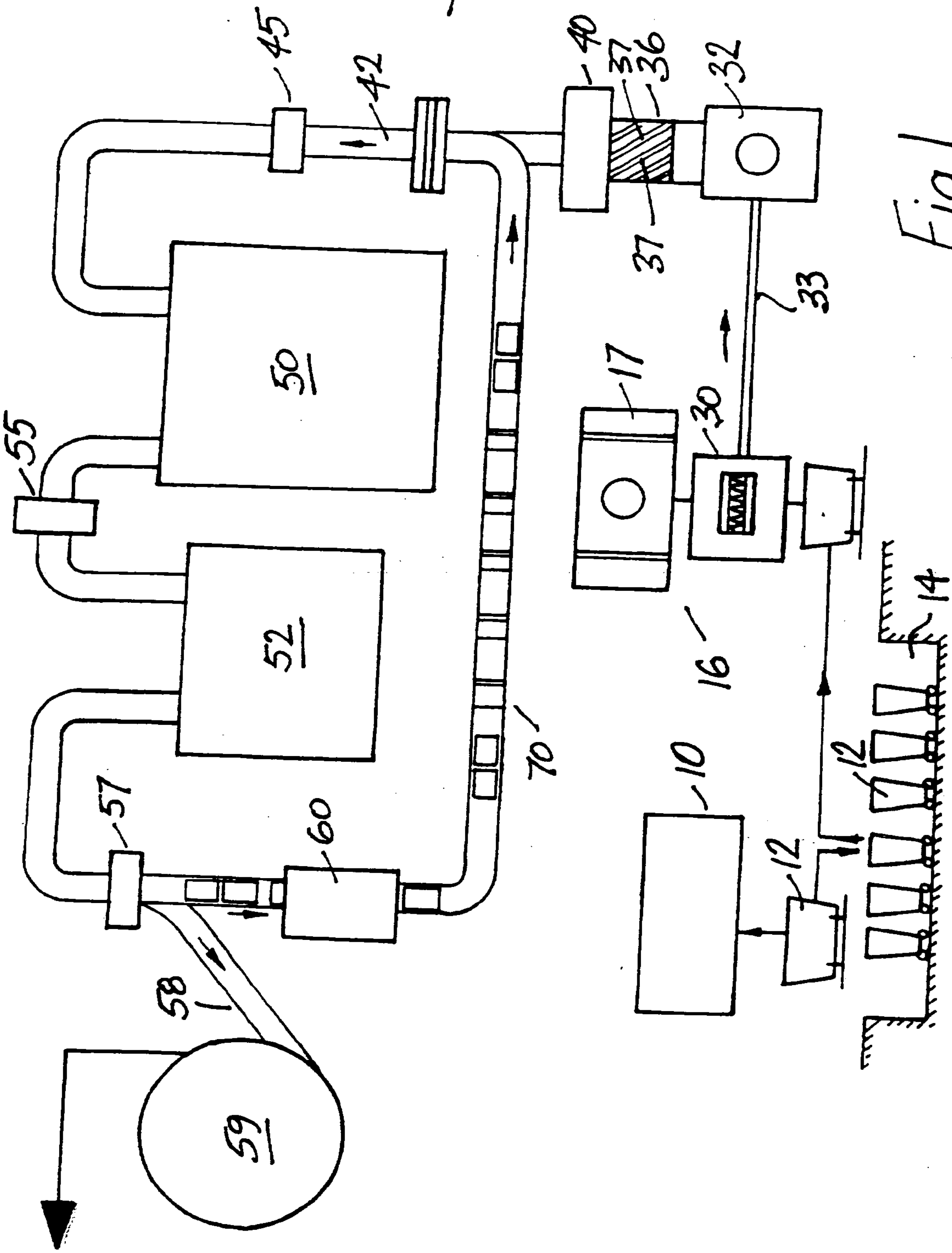

Fig. 1

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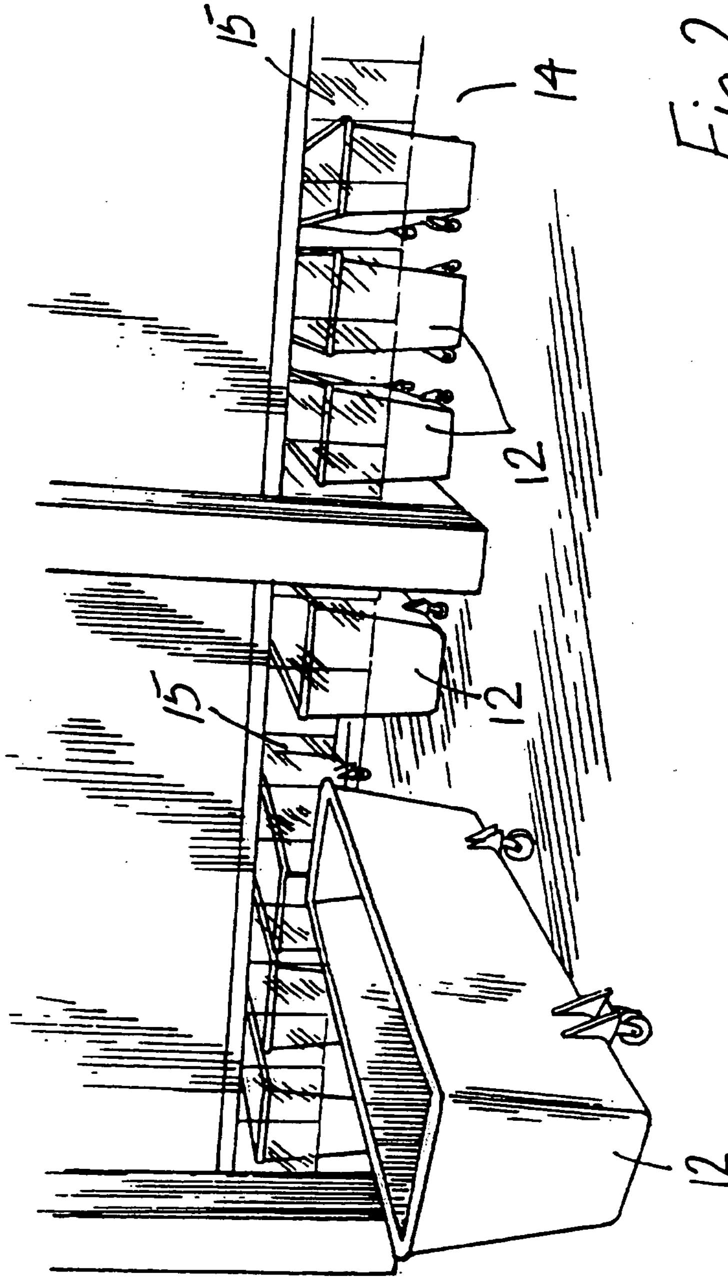

Fig.2

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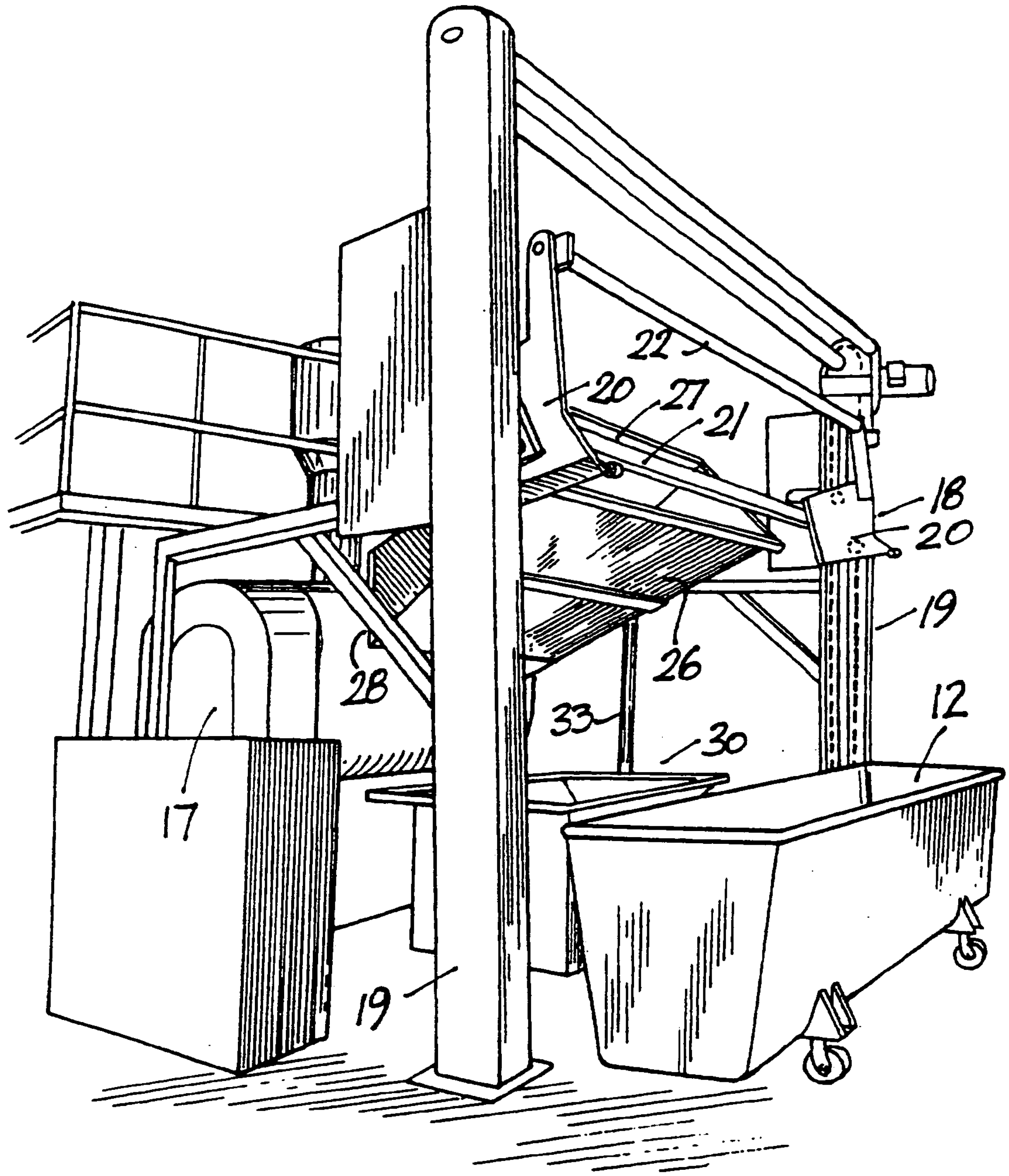

Fig.3

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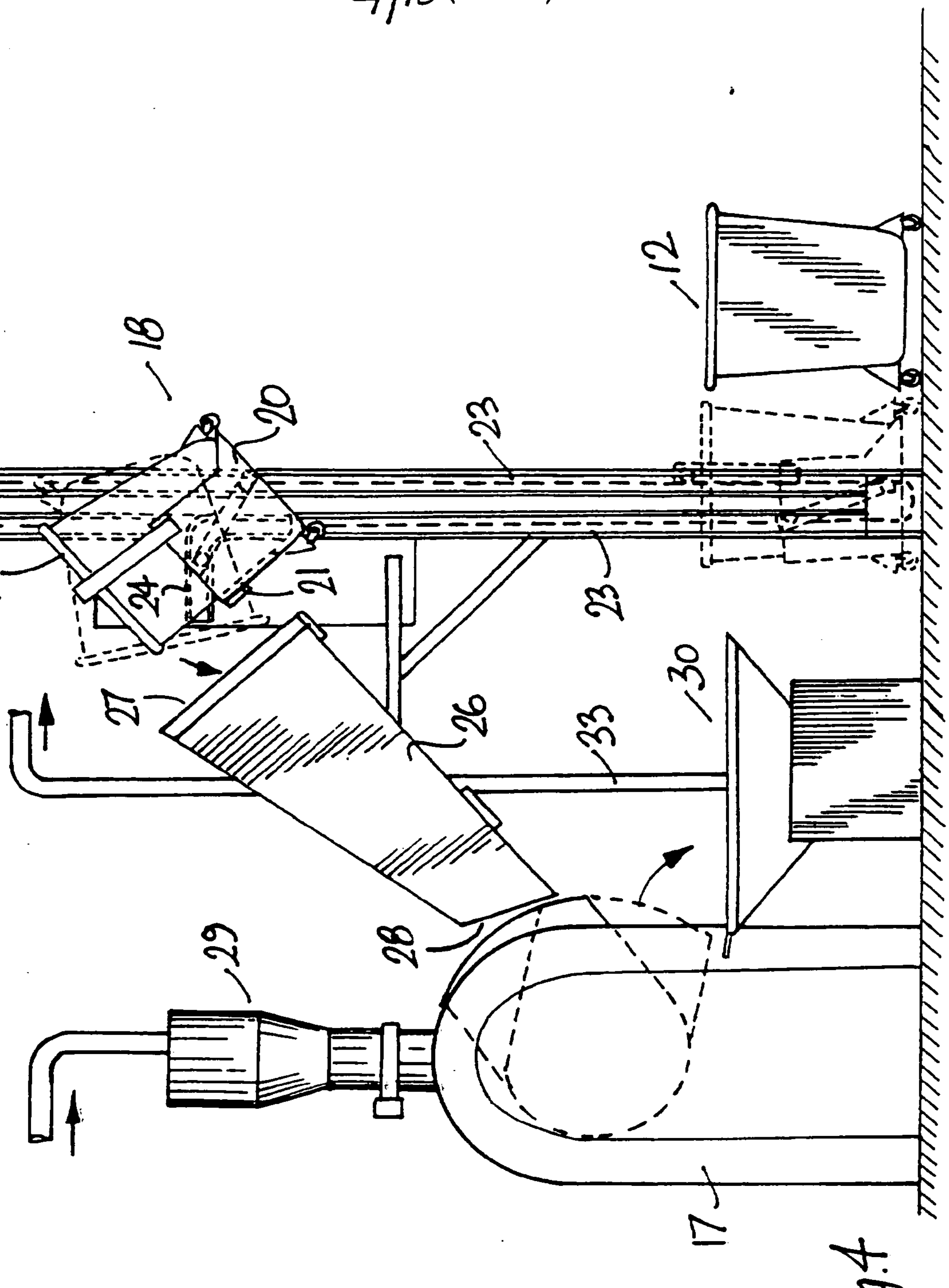

Fig.4

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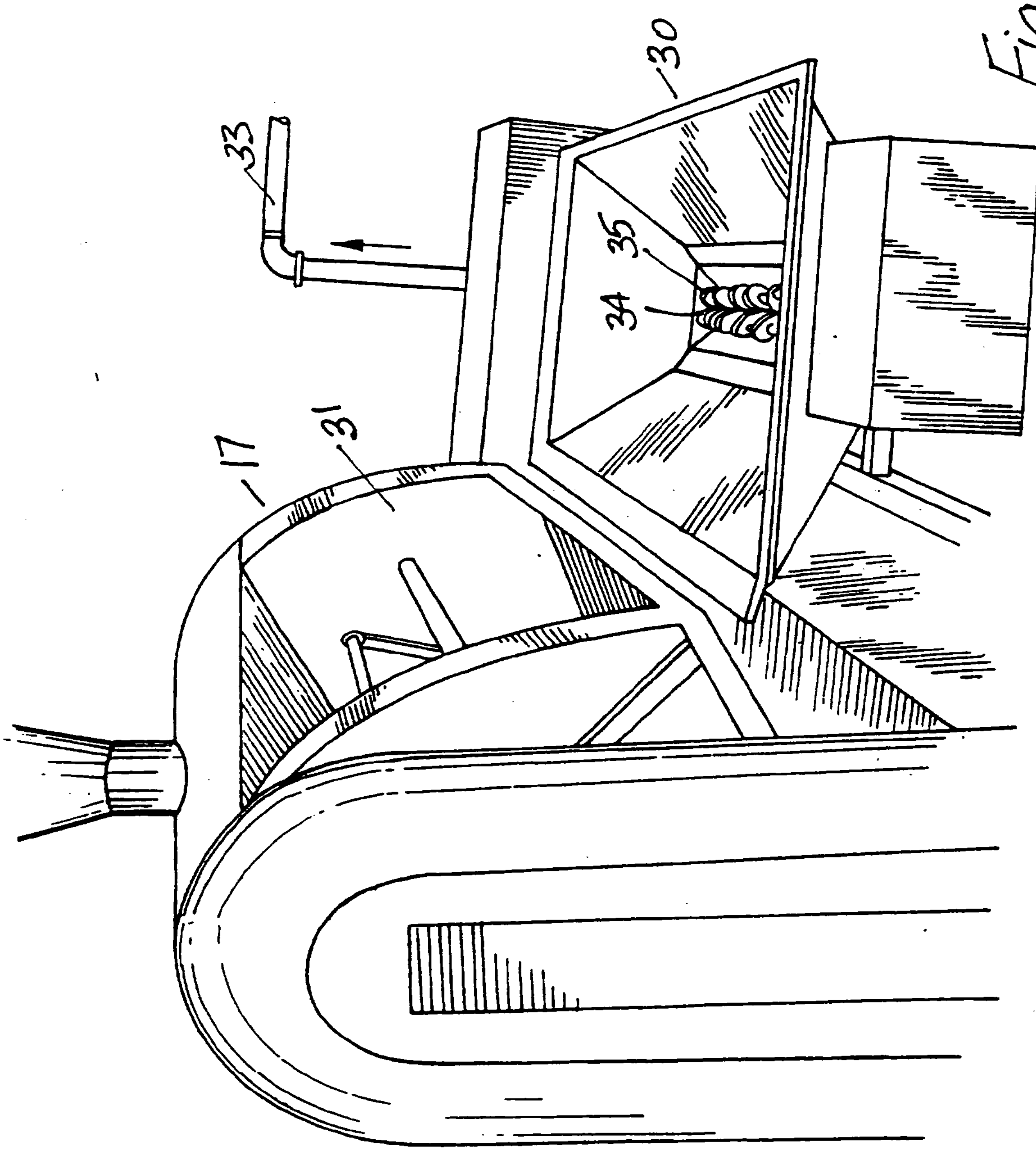

Fig.5

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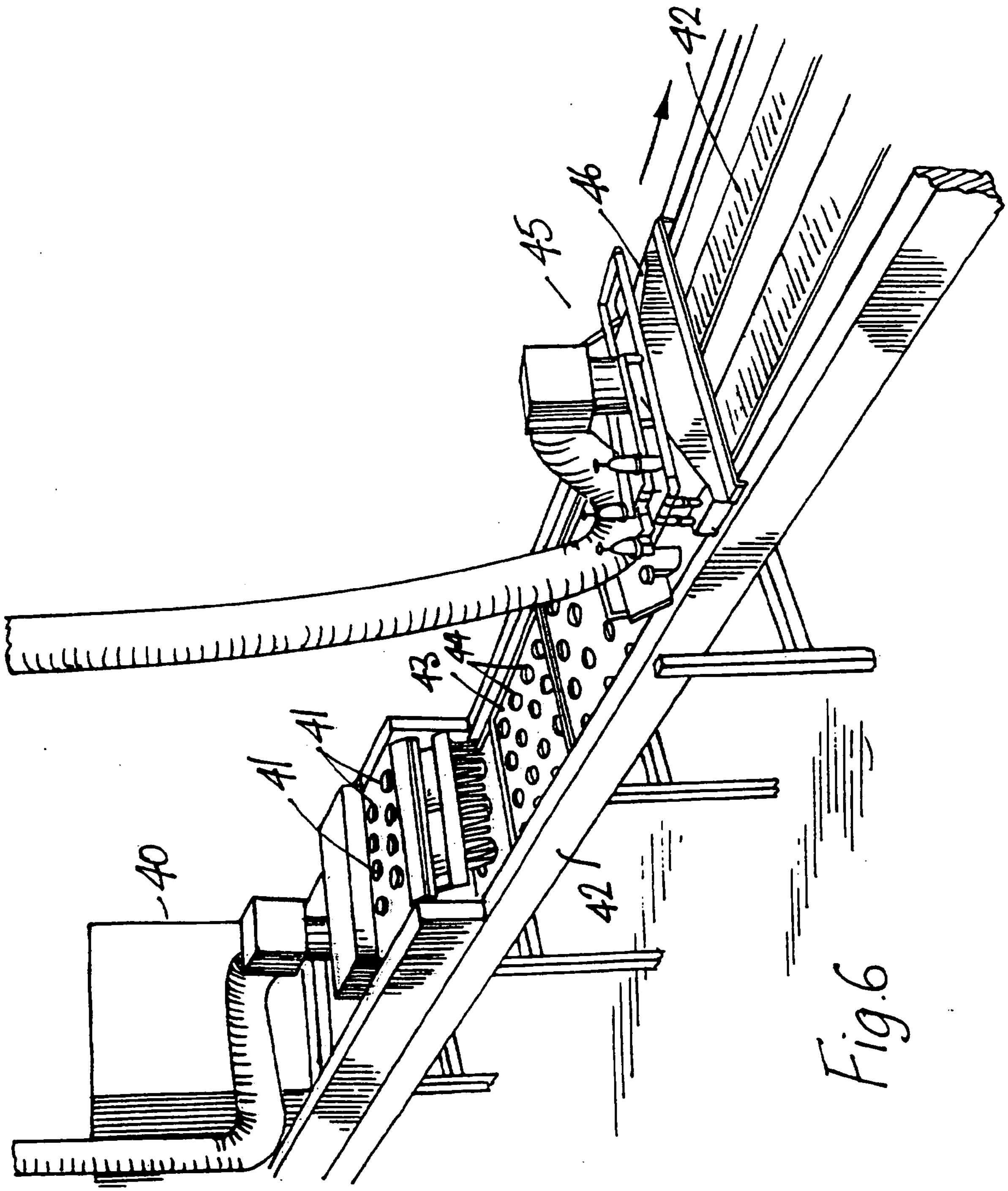

Fig.6

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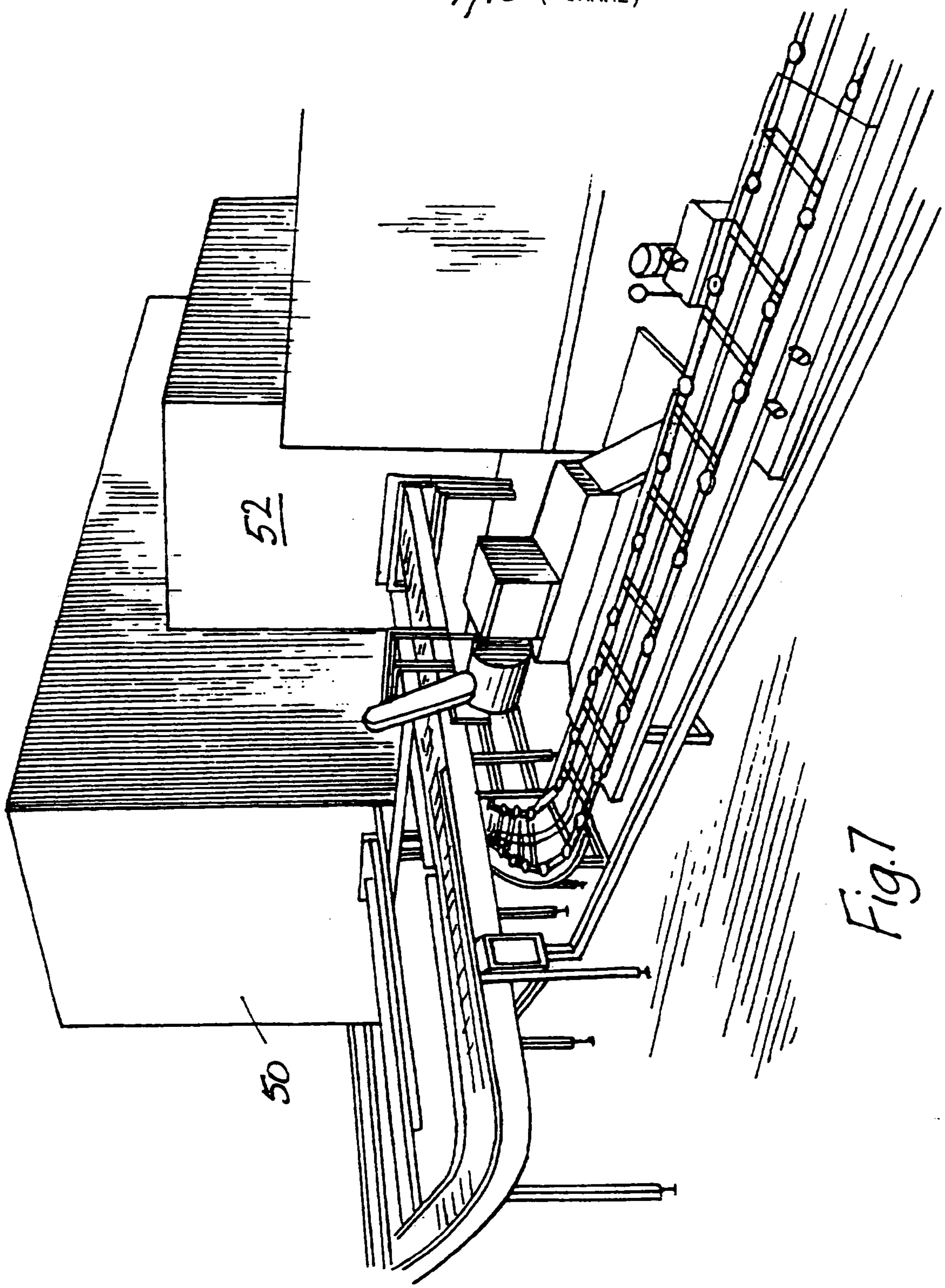

Fig.7

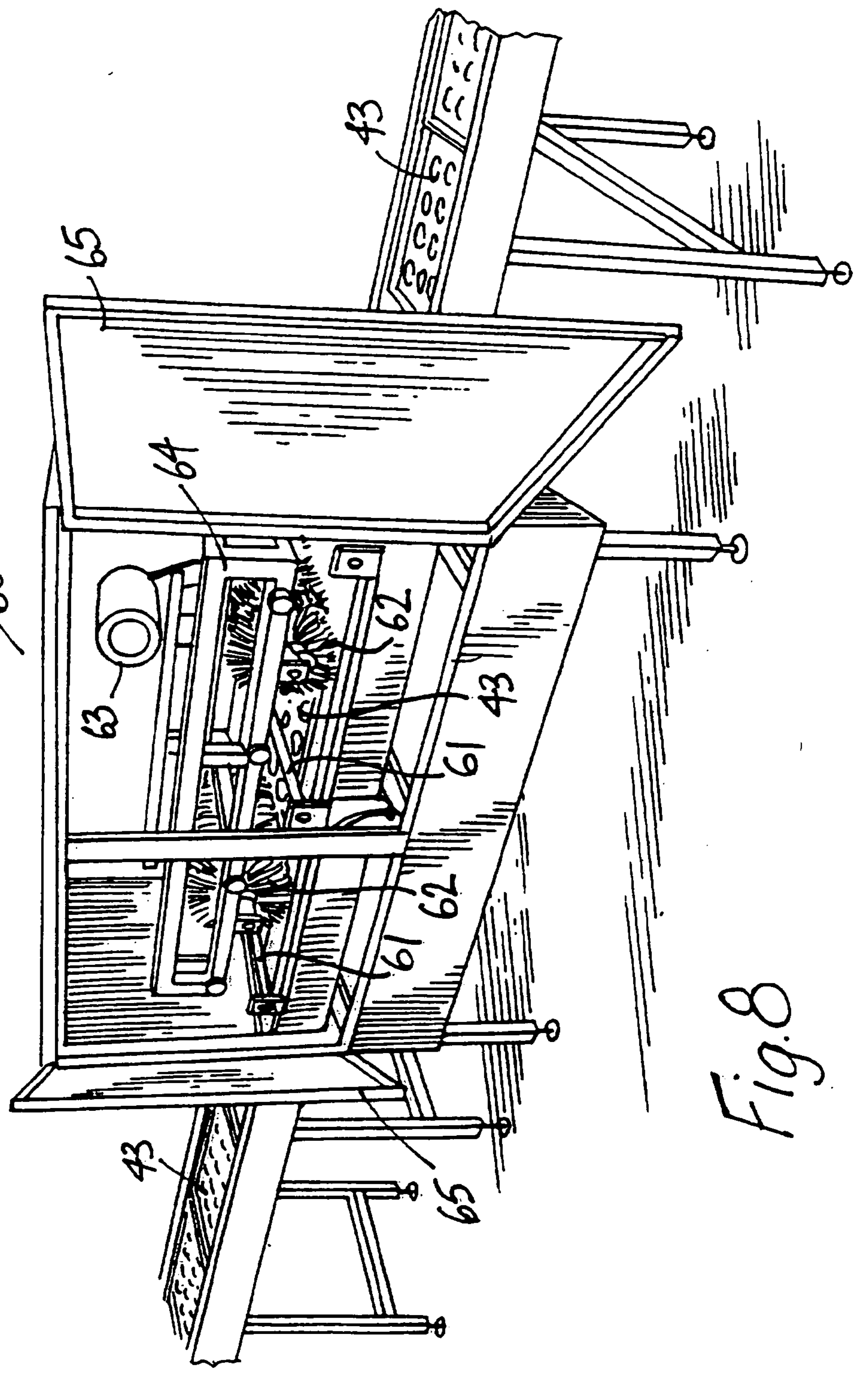

Fig.8

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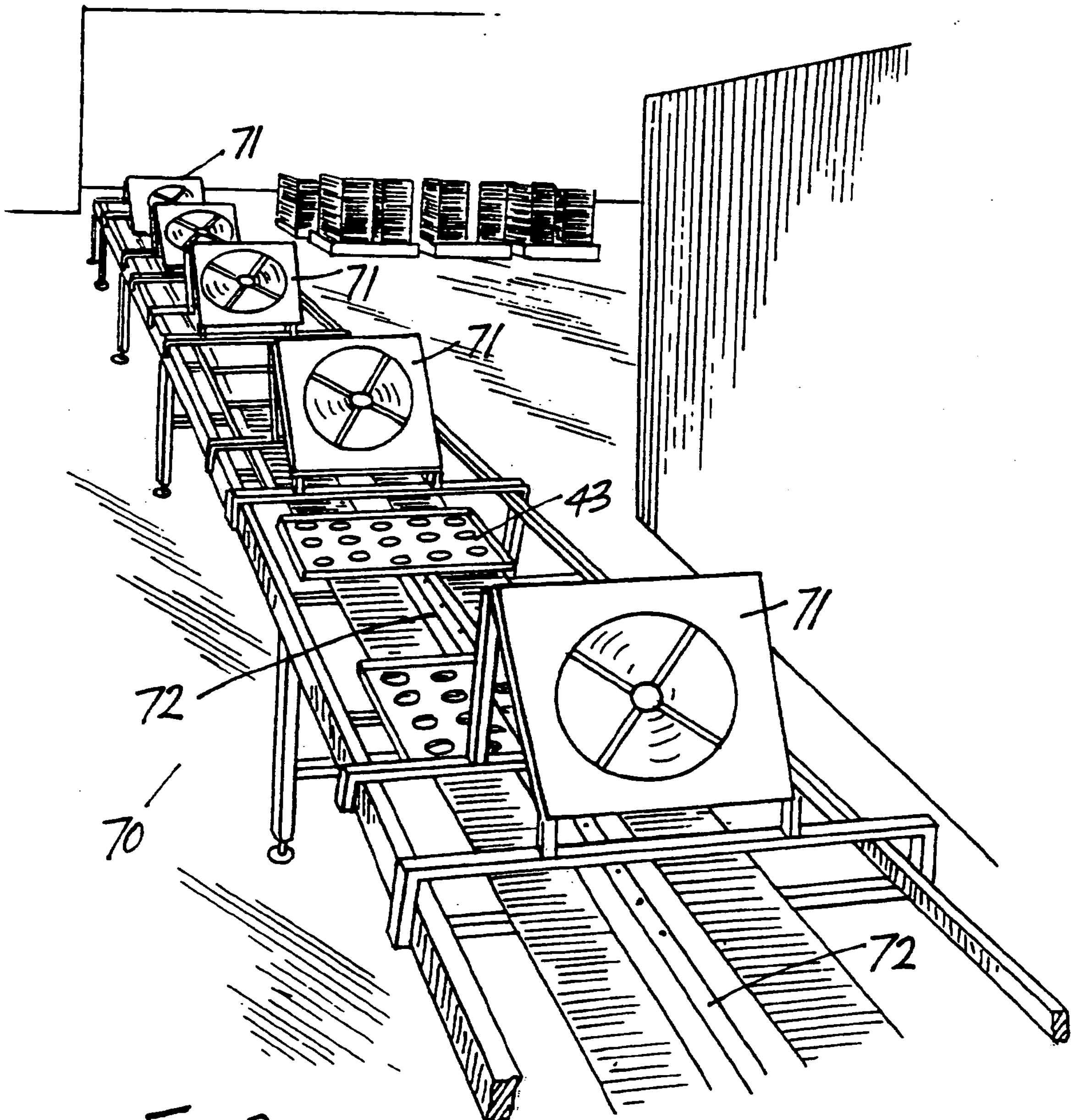

Fig.9

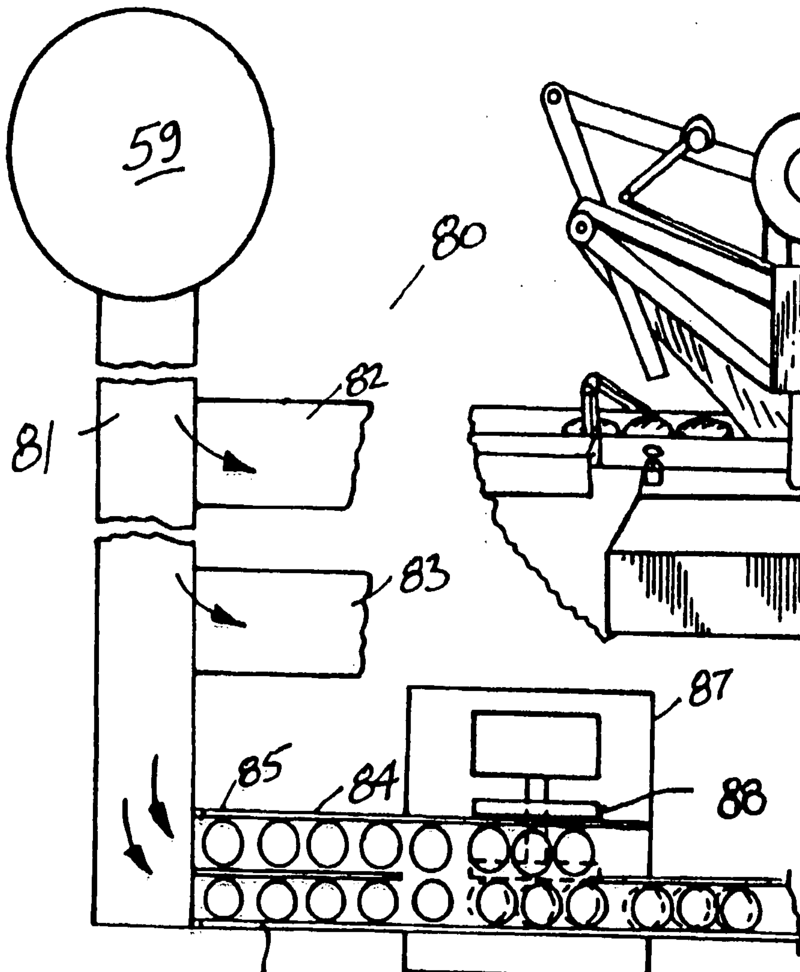

Fig.10

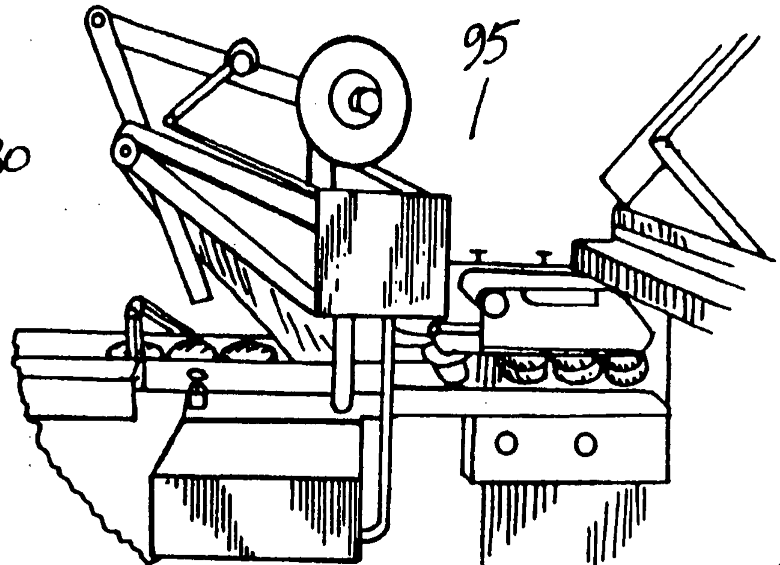

Fig.13

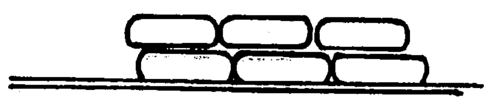
Fig.11

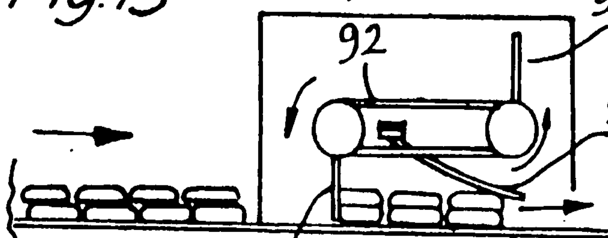

Fig.12

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